EMSP Student Research

One goal of the EMSP is to serve as a stimulus to focus the nation's science infrastructure on critical national environmental management problems. One of the primary ways to accomplish this goal is to increase the cadre of scientific expertise available to focus on EM problems. By making opportunities available for Post Doctoral, PhD, Masters, and Undergraduate research on EMSP projects, the program achieves this goal. This section describes the EMSP's accomplishments in the area of undergraduate, graduate, and post-graduate research support.

Project: 54546

Title: Engineered Antibodies for Monitoring of Polynuclear Aromatic Hydrocarbons
PI: Dr. Alexander E. Karu
Institution: University of California at Berkeley
Student Researchers: 5

Project: 54571

Title: Removal of Heavy Metals and Organic Contaminants from Aqueous Streams by Novel Filtration Methods
PI: Dr. Nelly M. Rodriguez
Institution: Northeastern University
Student Researchers: 8

Researcher characterizing sample by TEM. [see Project #54571]

Project: 54576

Title: On the Inclusion of the Interfacial Area Between Phases in the Physical and Mathematical Description of Subsurface Multiphase Flow
PI: Dr. William G. Gray *Institution:* University of Notre Dame
Student Researchers: 1

Project: 54585

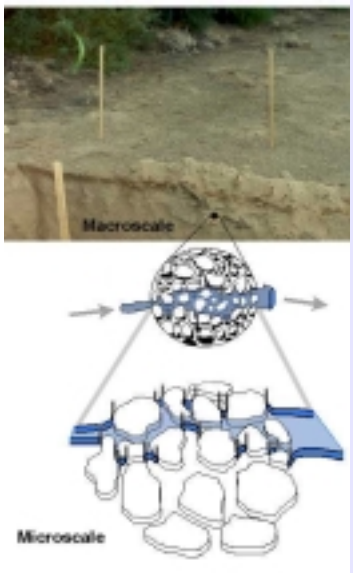
Title: Permanganate Treatment of DNAPLs in Reactive Barriers and Source Zone Flooding Schemes
PI: Dr. Frank W. Schwartz *Institution:* Ohio State University
Student Researchers: 3

Project: 54595

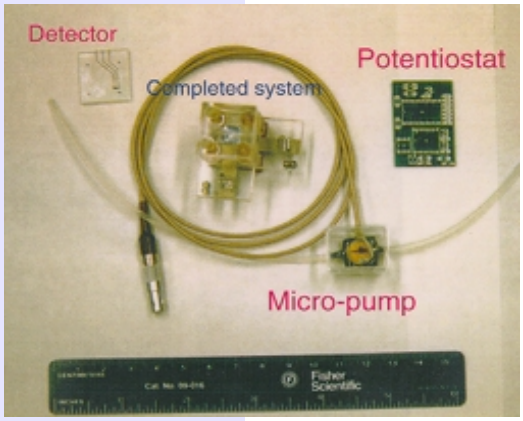
Title: f-Element Ion Chelation in Highly Basic Media
PI: Dr. Robert T. Paine *Institution:* University of New Mexico
Student Researchers: 3

Project: 54635

Title: Molecular-Level Process Governing the Interaction of Contaminants with Iron and Manganese
PI: Dr. Scott A. Chambers
Institution: Pacific Northwest National Laboratory
Student Researchers: 10



The specific effects of interfacial behavior between interfaces that separate different fluids or separate fluids from solids is being more carefully studied so that their net impacts on fluid flow the macroscopic scale can be better understood. [see Project #54576]



NMSU / PNNL Electrochemical Metal Microanalyzer [see Project #54639]

Project: 54639

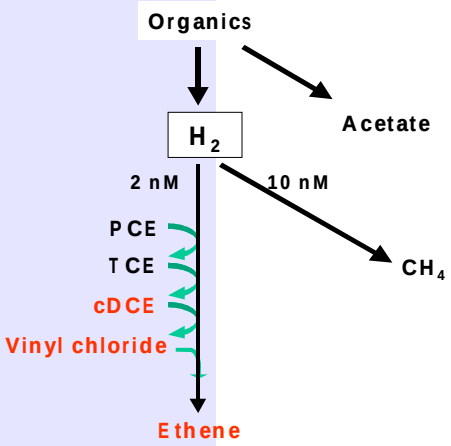
Title: Development of an In-Situ Microsensor for the Measurements of Chromium and Uranium in Groundwater at DOE Sites
PI: Dr. Joseph Wang
Institution: New Mexico State University
Student Researchers: 4

Project: 54656

Title: Mixing Processes in High-Level Waste Tanks
PI: Dr. Per F. Peterson
Institution: University of California at Berkeley
Student Researchers: 4

Project: 54661

Title: Electrochemical Processes for In-Situ Treatment of Contaminated Soils
PI: Dr. Chin-Pao Huang *Institution:* University of Delaware
Student Researchers: 1



PCE (or TCE) is stepwise reductively dehalogenated to the less chlorinated ethenes cDCE and VC. Concentration values indicate the hydrogen threshold concentration below which a pathway (dehalogenation or methanogenesis) usually does not operate.
[see Project #54666]

Project: 54666

Title: Mechanisms, Chemistry, and Kinetics of Anaerobic Biodegradation of cDCE and Vinyl Chloride
PI: Dr. Perry L. McCarty
Institution: Stanford University
Student Researchers: 3

Project: 54672

Title: Radiation Effects in Nuclear Waste Materials
PI: Dr. William J. Weber
Institution: Pacific Northwest National Laboratory
Student Researchers: 2

Project: 54674

Title: Design and Development of a New Hybrid Spectroelectrochemical Sensor
PI: Dr. William R. Heineman
Institution: University of Cincinnati
Student Researchers: 18

Project: 54679

Title: Architectural Design Criteria for F-Block Metal Ion Sequestering Agents
PI: Dr. Benjamin P. Hay *Institution:* Pacific Northwest National Laboratory
Student Researchers: 5

Project: 54681

Title: Dynamics of Coupled Contaminant and Microbial Transport in Heterogeneous Porous Media

PI: Dr. Timothy R. Ginn *Institution:* University of California at Davis
Student Researchers: 2

Project: 54683

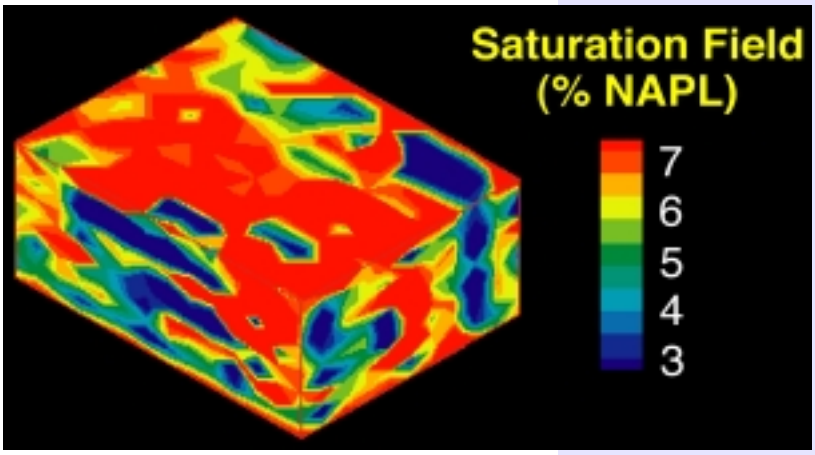
Title: Speciation and Structural Characterization of Plutonium and Actinide-Organic Complexes in Surface and Groundwaters
PI: Dr. Ken O. Buesseler *Institution:* Woods Hole Oceanographic Institute
Student Researchers: 2

Project: 54691

Title: Radiation Effects on Materials in the Near-Field of Nuclear Waste Repository
PI: Dr. Lu-Min Wang
Institution: University of Michigan
Student Researchers: 2

Project: 54716

Title: Polyoxometalates for Radioactive Waste Treatment
PI: Dr. Michael T. Pope
Institution: Georgetown University
Student Researchers: 4



NAPL saturation distribution estimated from partitioning tracer data for the Hill Air Force Base OU1 field test. [see Project #54716]

Project: 54724

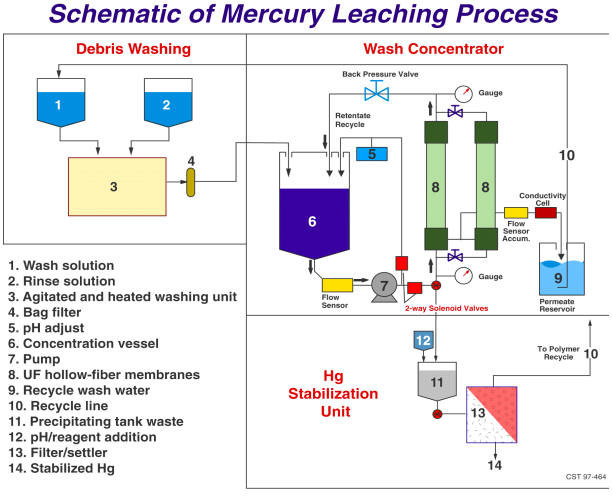
Title: Synthesis of New Water-Soluble Metal-Binding Polymers: Combinatorial Chemistry Approach
PI: Dr. Barbara F. Smith
Institution: Los Alamos National Laboratory
Student Researchers: 4

Project: 54735

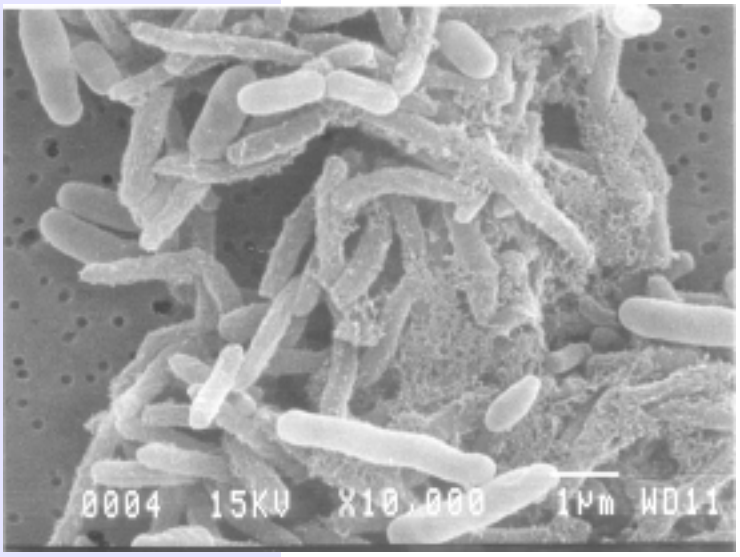
Title: Development of Inorganic Ion Exchangers for Nuclear Waste Remediation
PI: Dr. Abraham Clearfield
Institution: Texas A&M University at College Station
Student Researchers: 12

Project: 54765

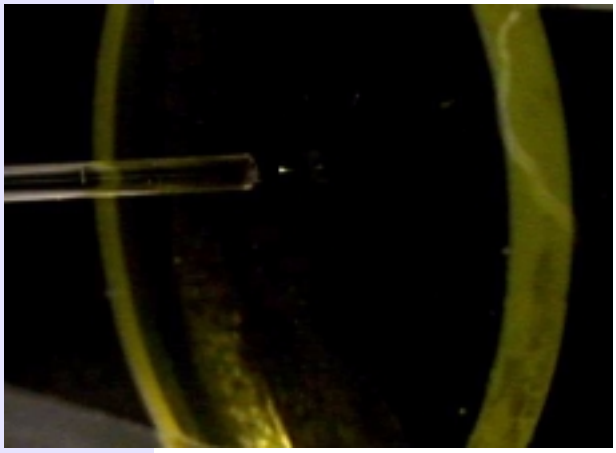
Title: Enhanced Sludge Processing of HLW: Hydrothermal Oxidation of Chromium, Technetium, and Complexants by Nitrate
PI: Dr. Stephen J. Buelow
Institution: Los Alamos National Laboratory
Student Researchers: 7



Schematic of Groundwater and Soil Remediation Process [see Project #54724]



A scanning electron microscope image showing dissimilatory iron-reducing bacteria with adherent hydrous ferric oxide. [see Project #54790]



An example of the capabilities of the Pacific Northwest Consortium beamline: A tapered glass capillary is used to produce a micron scale x-ray beam for microprobe applications. The micron size beam is visible as a glowing spot as it hits a scintillating screen. [see Project #54800]

Project: 54790

Title: Microbial Mineral Transformations at the Fe(II)/Fe(III) Redox Boundary for Solid Phase Capture of Strontium and Other Metal/Radionuclide Contaminants
PI: Dr. F. Grant Ferris
Institution: University of Toronto
Student Researchers: 6

Project: 54791

Title: Managing Tight-binding Receptors for New Separations Technologies
PI: Dr. Daryle H. Busch
Institution: University of Kansas
Student Researchers: 7

Project: 54793

Title: Establishing a Quantitative Functional Relationship Between Capillary Pressure, Saturation and Interfacial Area
PI: Dr. Carlo D. Montemagno
Institution: Cornell University
Student Researchers: 7

Project: 54800

Title: Construction of Bending Magnet Beamline at the APS for Environmental Studies
PI: Dr. Edward A. Stern
Institution: University of Washington
Student Researchers: 2

Project: 54807

Title: Studies Related to Chemical Mechanisms of Gas Formation in Hanford High-Level Nuclear Wastes
PI: Dr. E. Kent Barefield
Institution: Georgia Institute of Technology
Student Researchers: 3

Project: 54828

Title: Processing of High Level Waste: Spectroscopic Characterization of Redox Reactions in Supercritical Water
PI: Dr. Charles A. Arrington, Jr. *Institution:* Furman University
Student Researchers: 6

Project: 54856

Title: Structural Biology of the Sequestration & Transport of Heavy Metal Toxins: NMR Structure Determination of Proteins Containing the Cys-X-Y-Cys-metal Binding Motifs

PI: Dr. Stanley J. Opella *Institution:* University of Pennsylvania

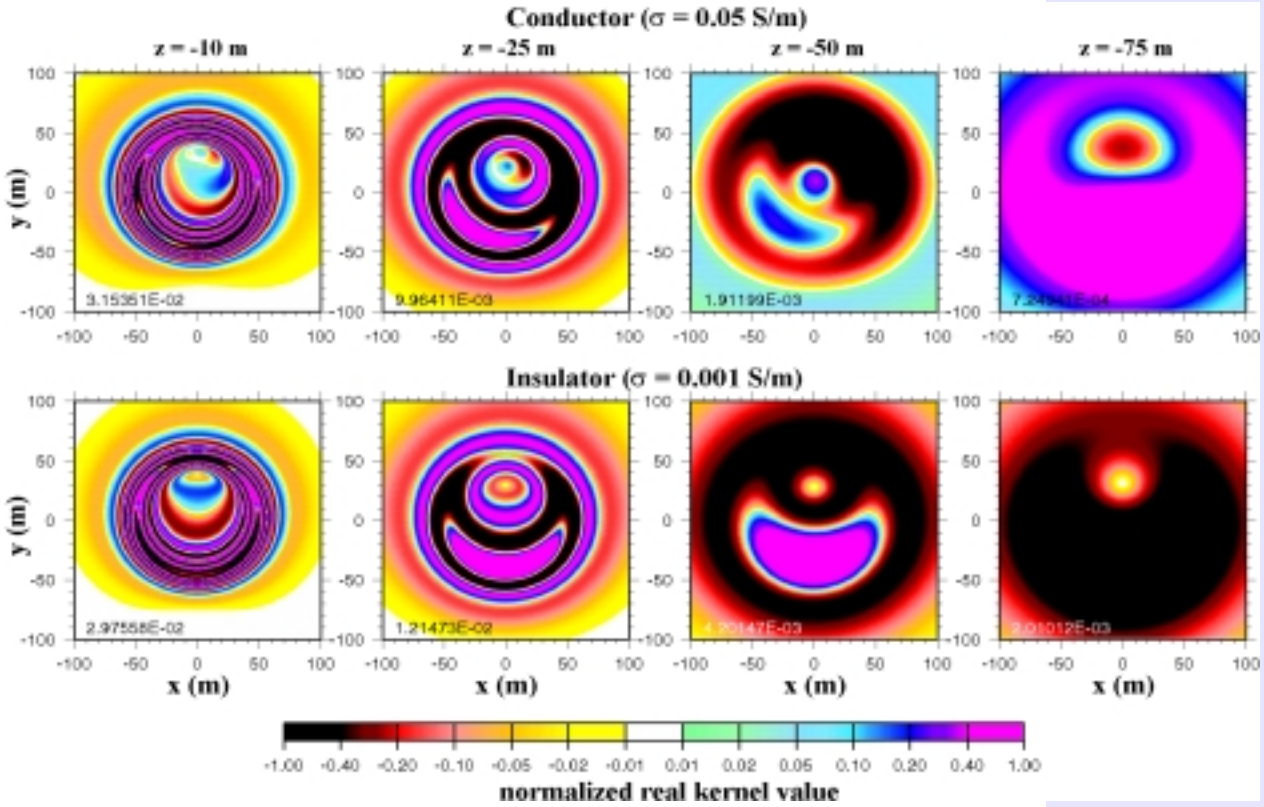
Student Researchers: 7

Project: 54857

Title: Surface Nuclear Magnetic Resonance Imaging of Water Content Distribution in the Subsurface

PI: Dr. Jan M.H. Hendrickx *Institution:* New Mexico Institute of Mining & Technology

Student Researchers: 2



The observed Nuclear Magnetic Resonance (NMR) response voltage response is given by the integration of an NMR sensitivity kernel against the free proton density function that characterizes the 3D water distribution. This figure shows horizontal (x-y) slices of the real part of the NMR sensitivity kernel at different specified depths (-10m, -25m, -50m, -75m) for a high resistivity (insulator) and low resistivity (conductive) half-space. This study derived for the first time the correct form of the kernels for a conducting medium. [see Project #54857]

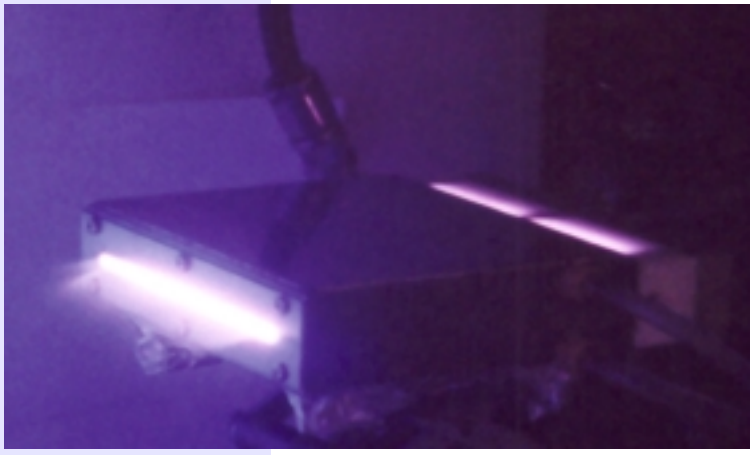
Project: 54864
Title: Supramolecular Chemistry of Selective Anion Recognition for Anions of Environmental Relevance
PI: Dr. Kristin Bowman-James *Institution:* University of Kansas
Student Researchers: 11

Project: 54889
Title: Using Trees to Remediate Groundwaters Contaminated with Chlorinated Hydrocarbons
PI: Dr. Stuart E. Strand *Institution:* University of Washington
Student Researchers: 3

Project: 54897
Title: The Sonophysics and Sonochemistry of Liquid Waste Quantification and Remediation
PI: Dr. Thomas J. Matula *Institution:* University of Washington
Student Researchers: 2

Project: 54898
Title: Molecular Dissection of the Cellular Mechanisms Involved in Nickel Hyperaccumulation in Plants
PI: Dr. David E. Salt *Institution:* Northern Arizona University
Student Researchers: 5

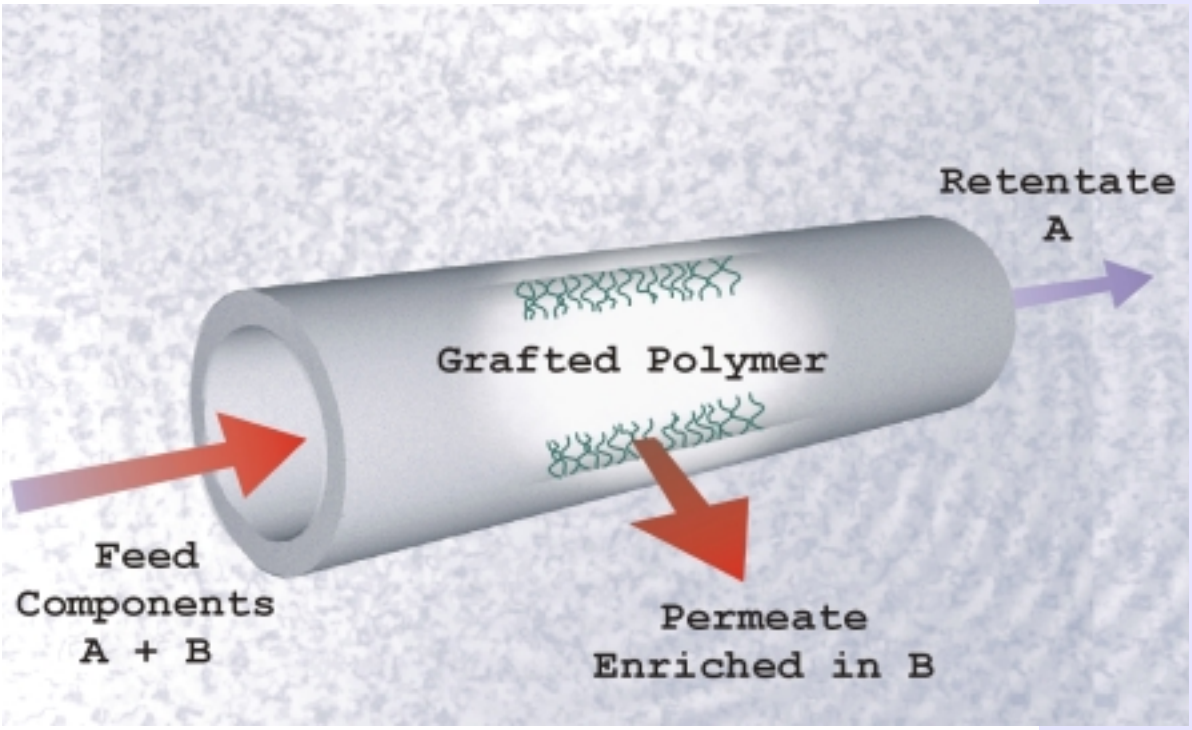
Project: 54908
Title: Partitioning Tracers for In Situ Detection and Quantification of Dense Non-aqueous Phase Liquids in Groundwater Systems
PI: Dr. Mark L. Brusseau *Institution:* University of Arizona
Student Researchers: 7



Front view of a 4" wide thermospheric-pressure plasma source operating with 750 Torr helium and 10 Torr oxygen. [see Project #54914]

Project: 54914
Title: Atmospheric-Pressure Plasma Cleaning of Contaminated Surfaces
PI: Dr. Robert F. Hicks
Institution: UCLA
Student Researchers: 5

Project: 54926
Title: Novel Ceramic-Polymer Composite Membranes for the Separation of Hazardous Liquid Waste
PI: Dr. Yoram Cohen
Institution: UCLA
Student Researchers: 7



Ceramic-Supported Polymer (CSP) Membranes [see Project #54926]

Project: 54942

Title: Spectroscopy, Modeling and Computation of Metal Chelate Solubility in Supercritical CO_2

PI: Dr. Joan F. Brennecke *Institution:* University of Notre Dame

Student Researchers: 5

Project: 54973

Title: A Novel Energy-Efficient Plasma Chemical Process for the Destruction of Volatile Toxic

PI: Dr. Lal A. Pinnaduwage *Institution:* Oak Ridge National Laboratory

Student Researchers: 3

Project: 54982

Title: Analysis of Surface Leaching Processes in Vitrified High-Level Nuclear Wastes Using In-Situ Raman Imaging and Atomistic Modeling

PI: Dr. Joseph H. Simmons *Institution:* University of Florida

Student Researchers: 4

Project: 55012

Title: Extraction and Recovery of Mercury and Lead from Aqueous Waste Streams Using Redox-Active Layered Metal Chalcogenides

PI: Dr. Peter K. Dorhout *Institution:* Colorado State University

Student Researchers: 9

Project: 55013

Title: Biofiltration of Volatile Pollutants: Engineering Mechanisms for Improved Design, Long-term Operation, Prediction and Implementation
PI: Dr. Brian H. Davison *Institution:* Oak Ridge National Laboratory
Student Researchers: 7 (see Communications Section for dissertations and theses associated with this project).

Metal Retention/Release Mechanisms for Geochemical Soil Processing. [see Project #55014]

Project: 55014

Title: Kinetics and Mechanisms of Metal Retention/Release in Geochemical Processes in Soil
PI: Dr. Robert W. Taylor
Institution: Alabama A&M University
Student Researchers: 16

Project: 55032

Title: Environmental Analysis of Endocrine Disrupting Effects from Hydrocarbon Contaminants in the Ecosystem
PI: Dr. John A. McLachlan
Institution: Tulane University
Student Researchers: 6

Project: 55033

Title: Characterization of Chemically Modified Hyperthermophilic Enzymes for Chemical Syntheses and Bioremediation Reactions
PI: Dr. Brian H. Davison *Institution:* Oak Ridge National Laboratory
Student Researchers: 2

Project: 55036

Title: Colloid Transport and Retention in Fractured Deposits
PI: Dr. John F. McCarthy *Institution:* Oak Ridge National Laboratory
Student Researchers: 6 (see Communications Section for dissertations and theses associated with this project).

Project: 55042

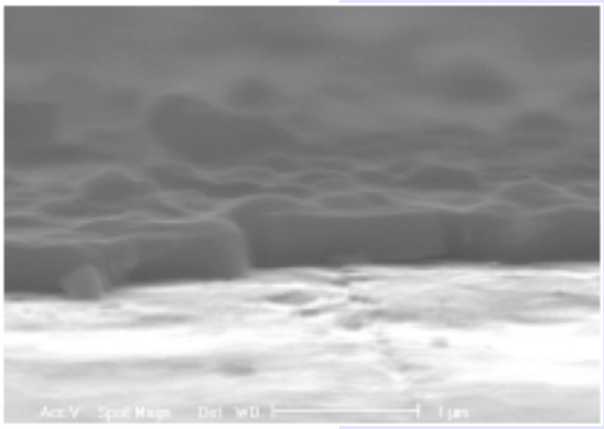
Title: Quantifying Silica Reactivity in Subsurface Environments: Controls of Reaction Affinity and Solute Matrix on Quartz and SiO_2 Glass Dissolution Kinetics
PI: Dr. Patricia M. Dove *Institution:* Georgia Institute of Technology
Student Researchers: 6

Project: 55052

Title: Advanced Sensing and Control Techniques to Facilitate Semi-Autonomous Decommissioning
PI: Dr. Robert J. Schalkoff *Institution:* Clemson University
Student Researchers: 14

Project: 55061

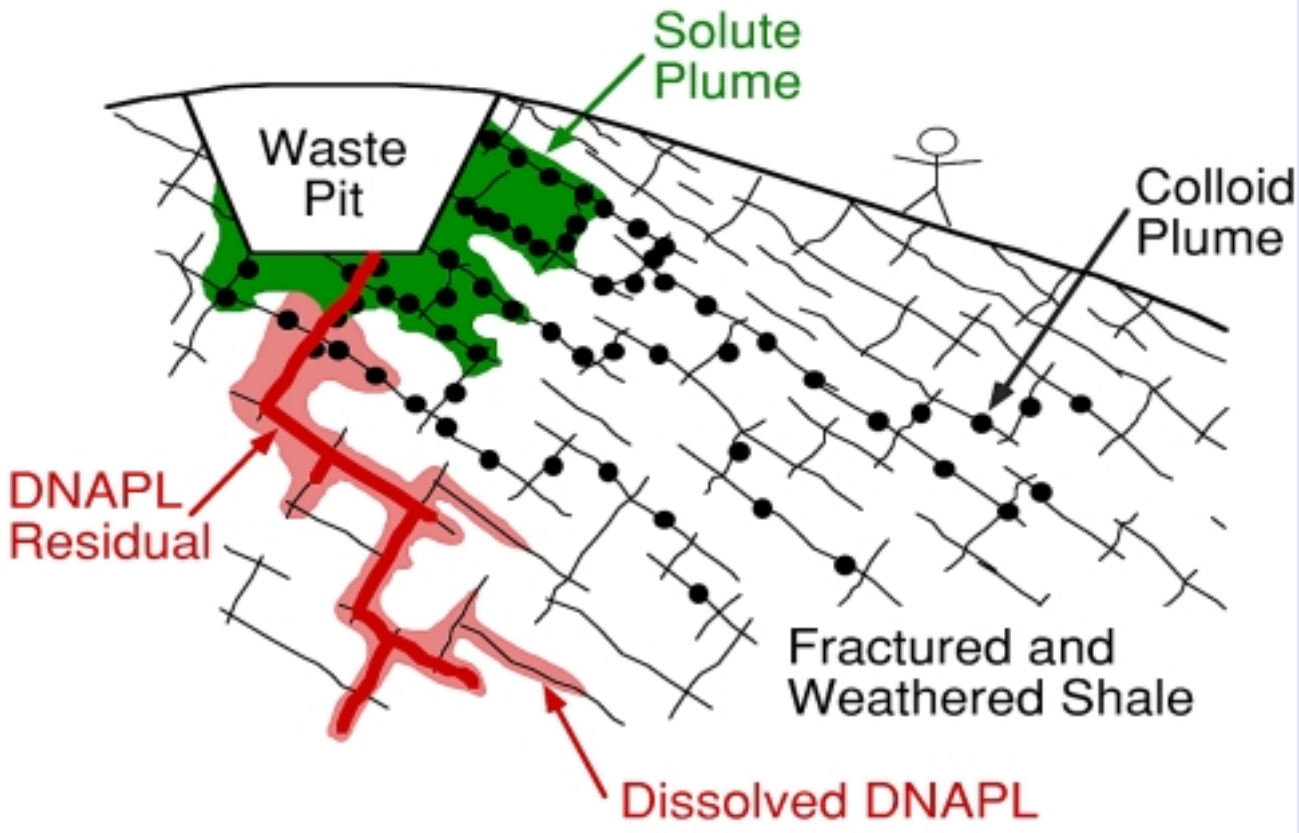
Title: Fundamental Studies of the Removal of Contaminants from Ground and Waste Waters via Reduction by Zero-Valent Metals
PI: Dr. Jory A. Yarmoff
Institution: University of California at Riverside
Student Researchers: 6



Scanning Electron Microscope (SEM) image of an approximately 1 µm thick uranium oxide film grown atop an iron substrate by immersion under controlled conditions into a solution containing uranyl ions. This illustrates how iron can be used for the remediation of uranium dissolved in groundwater. [see Project #55061]

Project: 55083

Title: Behavior of Dense, Immiscible Solvents in Fractured Clay-Rich Soils
PI: Dr. Larry D. McKay
Institution: University of Tennessee at Knoxville
Student Researchers: 4



Migration of different contaminant types in fractured shales at Oak Ridge National Laboratory. Colloids migrate fastest, up to 200 m/day, because they are largely confined to fast-flow pathways in the fractures. Solutes, such as tritium, are strongly retarded relative to colloids because of diffusion into the relatively immobile pore water in the fine-grained matrix between fractures. DNAPLs can rapidly infiltrate downwards through the fractures, and then slowly dissolve forming plumes in the fractures and matrix pores. [see Project #55083]

Project: 55087

Title: Design and Synthesis of the Next Generation of Crown Ethers for Waste Separations: An Inter-Laboratory Comprehensive Proposal
PI: Dr. Bruce A. Moyer *Institution:* Oak Ridge National Laboratory
Student Researchers: 6

Project: 55094

Title: Chemical and Ceramic Methods Toward Safe Storage of Actinides Using Monazite
PI: Dr. P. E. D. Morgan *Institution:* Rockwell International Corporation
Student Researchers: 2

Project: 55097

Title: Heavy Metal Pumps in Plants
PI: Dr. Jeffrey F. Harper *Institution:* The Scripps Research Institute
Student Researchers: 1

Project: 55100

Title: Human Genetic Marker for Resistance to Radiations and Chemicals
PI: Dr. Howard B. Lieberman *Institution:* Columbia University
Student Researchers: 1

Project: 55108

Title: Monitoring Genetic & Metabolic Potential for In Situ Bioremediation: Mass Spectrometry
PI: Dr. Michelle V. Buchanan *Institution:* Oak Ridge National Laboratory
Student Researchers: 3

Project: 55110

Title: An Alternative Host Matrix Based on Iron Phosphate Glasses for the Vitrification of Specialized Nuclear Waste Forms
PI: Dr. Delbert E. Day *Institution:* University of Missouri-Rolla
Student Researchers: 3

Project: 55115

Title: The Adsorption and Reaction of Halogenated Volatile Organic Compounds (VOCs) on Metal Oxides
PI: Dr. Jack Lunsford *Institution:* Texas A&M University at College Station
Student Researchers: 4

Project: 55118

Title: Plant Rhizosphere Effects on Metal Mobilization and Transport
PI: Dr. Teresa W. M. Fan *Institution:* University of California at Davis
Student Researchers: 2

Project: 55119

Title: Phase Equilibria Modification by Electric Fields
PI: Dr. Costas Tsouris
Institution: Oak Ridge National Laboratory
Student Researchers: 1

Phase equilibria and interfacial transport may be modified to enhance separations by applying an electric field. A vapor-liquid-equilibrium experiment is shown here. [see Project #55119]

Project: 55137

Title: Investigation of Novel Electrode Materials for Electrochemically-Based Remediation of High- and Low-Level Mixed Wastes in the DOE Complex
PI: Dr. Nathan S. Lewis
Institution: California Institute of Technology
Student Researchers: 8

Project: 55146

Title: Adsorption/Membrane Filtration as a Contaminant Concentration and Separation Process for Mixed Wastes and Tank Wastes
PI: Dr. Mark M. Benjamin
Institution: University of Washington
Student Researchers: 6

Project: 55152

Title: Molecular Profiling of Microbial Communities from Contaminated Sources: Use of Subtractive Cloning Methods and rDNA Spacer Sequences
PI: Dr. Frank T. Robb *Institution:* University of Maryland at Baltimore
Student Researchers: 5

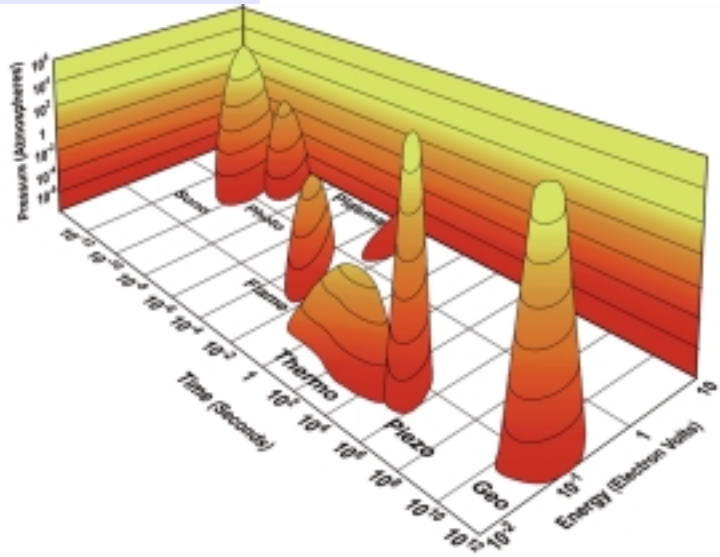
Project: 55171

Title: Development of Advanced In Situ Techniques for Chemistry Monitoring and Corrosion Mitigation in SCWO Environments
PI: Dr. Digby D. MacDonald
Institution: Pennsylvania State University
Student Researchers: 4

Project: 55196

Title: In Situ, Field Scale Evaluation of Surfactant Enhanced DNAPL Recovery Using a Single-Well, Push-Pull Test
PI: Dr. Jonathan D. Istok
Institution: Oregon State University
Student Researchers: 3

Graduate students collaborate on a field-scale evaluation of Surfactant Enhanced DNAPL Recovery using a single-well, push-pull test. [see Project #55196]



Chemical Islands. Chemistry is the interaction of energy and matter. The parameters that control this interaction are the amount of energy, the time of the interaction, and the pressure under which the interaction occurs. This describes the three dimensional space shown above, with many of the various types of chemistry shown in their proper place in this space. [see Project #55211]

Project: 55211

Title: Cavitational Hydrothermal Oxidation: A New Remediation Process
PI: Dr. Kenneth S. Suslick
Institution: University of Illinois at Urbana-Champaign
Student Researchers: 3

Project: 55218

Title: Seismic Surface-Wave Tomography of Waste Sites
PI: Dr. Timothy L. Long
Institution: Georgia Institute of Technology
Student Researchers: 6

Project: 55223

Title: De Novo Design of Ligands for Metal Separation
PI: Dr. Garland R. Marshall
Institution: Washington University
Student Researchers: 2

Project: 55267

Title: Containment of Toxic Metals and Radionuclides in Porous and Fractured Meda: Optimizing Biogeochemical Reduction Versus Geochemical Oxidation
PI: Dr. Philip M. Jardine *Institution:* Oak Ridge National Laboratory
Student Researchers: 10 (see Communications Section for dissertations and theses associated with this project.)

Project: 55278

Title: Molecular Genetics of Metal Detoxification: Prospects for Phytoremediation
PI: Dr. David W. Ow *Institution:* U.S. Dept. of Agriculture
Student Researchers: 1

Project: 55284

Title: Aquifer Transport of Th, U, Ra, and Rn in Solution and on Colloids
PI: Dr. G. J. Wasserburg *Institution:* California Institute of Technology
Student Researchers: 2

Project: 55318

Title: Improved Analytical Characterization of Solid Waste Forms by Fundamental Development of Laser Ablation Technology
PI: Dr. Richard E. Russo *Institution:* Lawrence Berkeley National Laboratory
Student Researchers: 3

Project: 55332

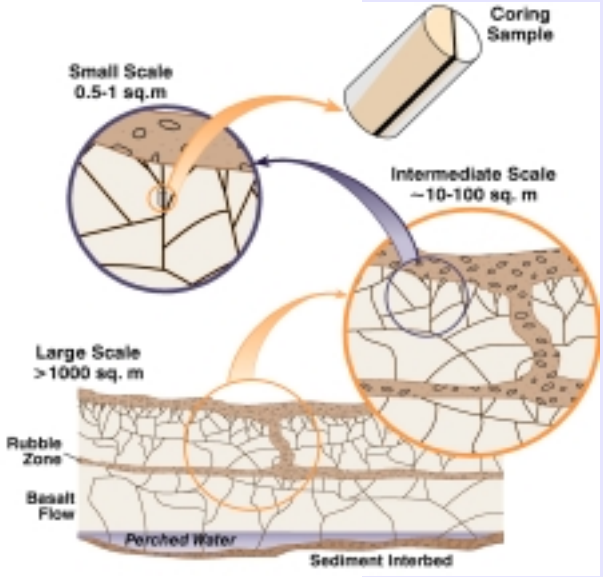
Title: A Hybrid Hydrologic-Geophysical Inverse Technique for the Assessment and Monitoring of Leachates in the Vadose Zone
PI: James R. Brainard *Institution:* Sandia National Laboratories
Student Researchers: 7 (see Communications Section for dissertations and theses associated with this project).

Project: 55356

Title: Environmentally-Induced Malignancies: An In Vivo Model to Evaluate the Health Impact of Chemicals in Mixed Waste
PI: Dr. Maria Pallavicini *Institution:* University of California at San Francisco
Student Researchers: 2

Project: 55359

Title: Chaotic-Dynamical Conceptual Model to Describe Fluid Flow and Contaminant Transport in a Fractured Vadose Zone
PI: Dr. Boris Faybishenko
Institution: Lawrence Berkeley National Laboratory
Student Researchers: 4



A four-level hierarchy of scales of hydrogeological components in fractured basalt. [see Project #55359]

Project: 55374

Title: Use of Sonication for In-Well Softening of Semivolatile Organic Compounds
PI: Dr. Robert W. Peters
Institution: Argonne National Laboratory
Student Researchers: 2

Project: 55388

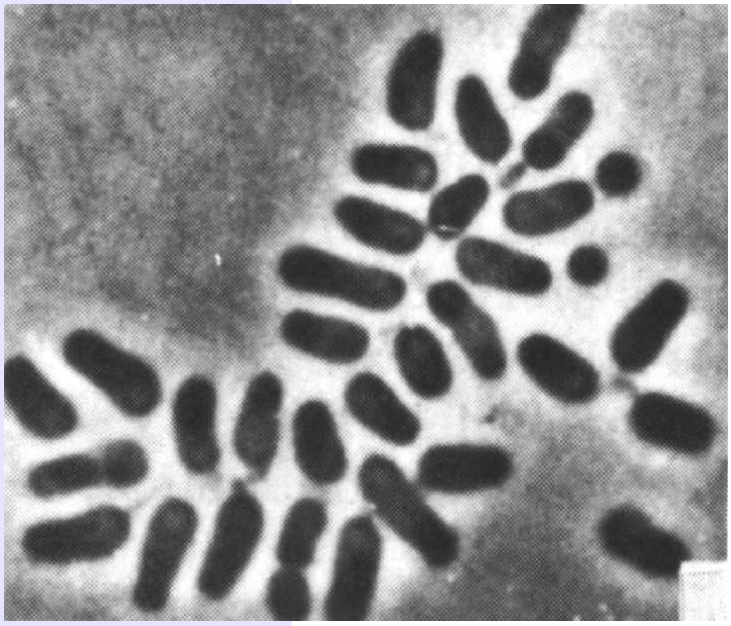
Title: Stable Isotopic Investigations of In Situ Bioremediation of Chlorinated Organic Solvents
PI: Dr. Neil C. Sturchio
Institution: Argonne National Laboratory
Student Researchers: 4

Project: 55395

Title: Physics of DNAPL Migration and Remediation in the Presence of Heterogeneities
PI: Dr. Stephen H. Conrad *Institution:* Sandia National Laboratories
Student Researchers: 3

Project: 55416

Title: Control of Biologically Active Degradation Zones by Vertical Heterogeneity: Applications in Fractured Media
PI: Dr. Frederick S. Colwell *Institution:* Idaho National Engineering and Environmental Laboratory
Student Researchers: 2



Naturally-occurring TCE-degrading microorganisms may naturally attenuate the TAN TCE plume at low concentrations. [see Project #55416]

Project: 59786

Title: Design and Construction of *Deinococcus radiodurans* for Biodegradation of Organic Toxins at Radioactive DOE Waste Sites
PI: Dr. Michael J. Daly
Institution: Uniformed Services Univ. of the Health Sciences
Student Researchers: 1

Project: 59827

Title: The Influence of Radiation and Multivalent Cation Additions on Phase Separation and Crystallization of Glass
PI: Dr. Michael C. Weinberg
Institution: University of Arizona
Student Researchers: 3

Project: 59828

Title: Bioavailability of Organic Solvents in Soils: Input into Biologically Based Dose-Response Models for Human Risk Assessments
PI: Dr. Ronald C. Wester *Institution:* University of California at San Francisco
Student Researchers: 2

Project: 59918

Title: Improved Radiation Dosimetry/Risk Estimates to Facilitate Environmental Management of Plutonium Contaminated Sites
PI: Dr. Bobby R. Scott *Institution:* Lovelace Biomedical & Environmental Research
Student Researchers: 1

Project: 59925

Title: Modeling of Diffusion of Plutonium in Other Metals and of Gaseous Species in Plutonium-Based Systems
PI: Dr. Bernard R. Cooper *Institution:* West Virginia University
Student Researchers: 1

Project: 59934

Title: Hazardous Gas Production by Alpha Particles in Solid Organic Transuranic Waste Matrices
PI: Dr. Jay A. LaVerne *Institution:* University of Notre Dame
Student Researchers: 1

Project: 59960

Title: Direct Investigations of the Immobilization of Radionuclides in the Alteration Phases of Spent Nuclear Fuel
PI: Dr. Peter C. Burns *Institution:* University of Notre Dame
Student Researchers: 4

Project: 59977

Title: Synthesis and Characterization of Templated Ion Exchange Resins for the Selective Complexation of Actinide Ions
PI: Dr. George M. Murray *Institution:* Johns Hopkins University Applied Physics Lab
Student Researchers: 2

Project: 59990

Title: Fundamental Chemistry, Characterization, and Separation of Technetium Complexes in Hanford Waste
PI: Dr. Norman C. Schroeder *Institution:* Los Alamos National Laboratory
Student Researchers: 3

Project: 59993

Title: Dynamic Effects of Tank Waste Aging on Radionuclide-Complexant Interactions
PI: Dr. Rebecca Chamberlin *Institution:* Los Alamos National Laboratory
Student Researchers: 2

Project: 60015

Title: Long-term Risk from Actinides in the Environment: Modes of Mobility
PI: Dr. David D. Breshears *Institution:* Los Alamos National Laboratory
Student Researchers: 2

Project: 60017

Title: Removal of Technetium, Carbon Tetrachloride, and Metals from DOE Properties
PI: Dr. Thomas E. Mallouk *Institution:* Pennsylvania State University
Student Researchers: 3

Project: 60020

Title: Stability of High-Level Waste Forms
PI: Dr. Theodore M. Besmann *Institution:* Oak Ridge National Laboratory
Student Researchers: 1

Project: 60037

Title: Estimation of Potential Population Level Effects of Contaminants on Wildlife
PI: Ms. Linda Mann *Institution:* Oak Ridge National Laboratory
Student Researchers: 2

Project: 60041

Title: Removal of Radioactive Cations and Anions from Polluted Water Using Ligand-Modified Colloid-Enhanced Ultrafiltration
PI: Dr. John F. Scamehorn *Institution:* University of Oklahoma
Student Researchers: 2

Project: 60069
Title: Least-Cost Groundwater Remediation Design Using Uncertain Hydrogeological Information
PI: Dr. George F. Pinder *Institution:* University of Vermont
Student Researchers: 2

Project: 60070
Title: The Development of Cavity Ringdown Spectroscopy as a Sensitive Continuous Emission Monitor for Metals
PI: Dr. George P. Miller *Institution:* Mississippi State University
Student Researchers: 2

Project: 60075
Title: Particle Generation by Laser Ablation in Support of Chemical Analysis of High Level Mixed Waste from Plutonium Production Operations
PI: Dr. J. Thomas Dickinson *Institution:* Washington State University
Student Researchers: 8

Project: 60096
Title: Rational Synthesis of Imprinted Organofunctional Sol-Gel Materials for Toxic Metal Separation
PI: Dr. Ziling Benjamin Xue *Institution:* University of Tennessee at Knoxville
Student Researchers: 9

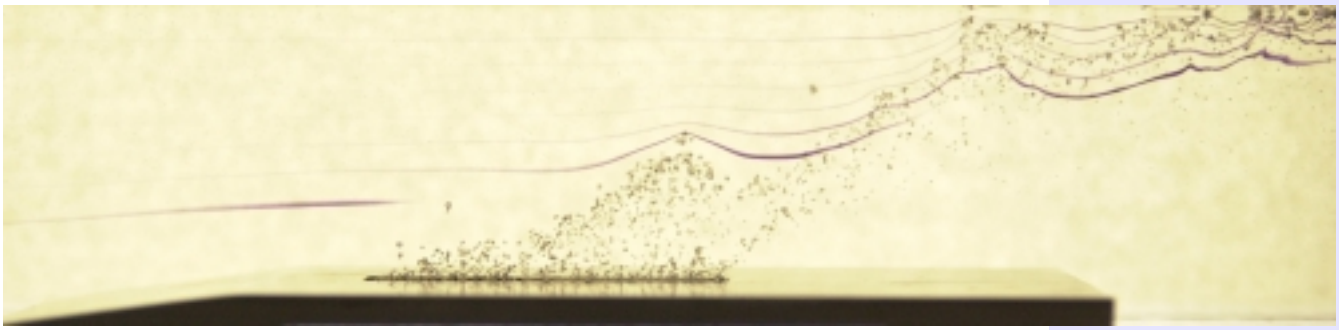
Project: 60115
Title: Advanced High Resolution Seismic Imaging, Material Properties Estimation and Full Wavefield Inversion for the Shallow Subsurface
PI: Dr. Alan Levander *Institution:* Rice University
Student Researchers: 1

Project: 60118
Title: Fundamental Thermodynamics of Actinide-Bearing Mineral Waste Forms
PI: Dr. Mark A. Williamson *Institution:* Argonne National Laboratory
Student Researchers: 3

Project: 60123
Title: Potential-Modulated Intercalation of Alkali Cations into Metal Hexacyanoferrate Coated
PI: Dr. Daniel T. Schwartz *Institution:* University of Washington
Student Researchers: 3

Project: 60143
Title: Foaming in Radioactive Waste Treatment and Immobilization Processes
PI: Dr. Darsh T. Wasan *Institution:* Illinois Institute of Technology
Student Researchers: 4

Project: 60144
Title: Flow Visualization of Forced and Natural Convection in Internal Cavities
PI: Dr. John C. Crepeau *Institution:* University of Idaho
Student Researchers: 4



A fluid containing hexanoic acid reacts with sodium metal embedded in an aluminum plate to produce hydrogen bubbles. The dye illustrates the disturbances in the flow caused by the bubbles. This reaction simulates a passivation reaction during treatment of corroded spent nuclear fuels. [see Project #60144]

Project: 60150

Title: Genetic Engineering of a Radiation-Resistant Bacterium for Biodegradation of Mixed Wastes
PI: Dr. Mary E. Lidstrom *Institution:* University of Washington
Student Researchers: 4

Project: 60158

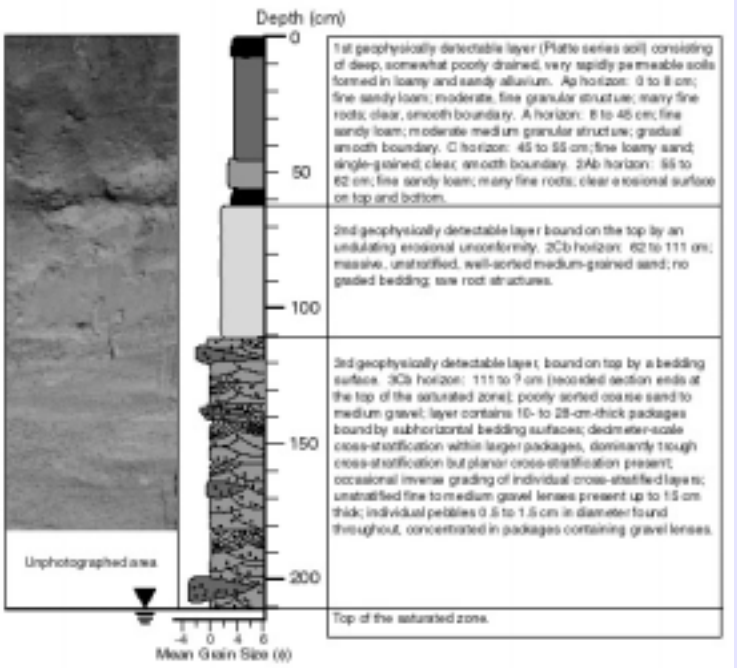
Title: Development of Radon-222 as a Natural Tracer for Monitoring the Remediation of NAPL Contamination in the Subsurface
PI: Dr. Lewis Semprini
Institution: Oregon State University
Student Researchers: 1

Project: 60163

Title: Investigation of Techniques to Improve Continuous Air Monitors Under Conditions of High Dust Loading in Environmental Settings
PI: Dr. Stephen D. Schery
Institution: New Mexico Institute of Mining & Technology
Student Researchers: 1

Project: 60199

Title: Seismic-Reflection and Ground Penetrating Radar for Environmental Site Characterization
PI: Dr. Don W. Steeples
Institution: University of Kansas
Student Researchers: 3 (see Communications Section for dissertations and theses associated with this project.)



Photograph, stratigraphic column, and description of hand-dug hole located approximately 15m from seismic and GPR lines. Ground-penetrating radar successfully imaged the two upper interfaces but not the top of the saturated zone. The seismic-reflection technique imaged the three main interfaces. Both techniques imaged some reflectors within the main layers, interpreted as cross-bedding or unidentified lenses. [see Project #60199]

Project: 60218

Title: Novel Mass Spectrometry Mutation Screening for Contaminant Impact Analysis
PI: Dr. C. H. Winston Chen *Institution:* Oak Ridge National Laboratory
Student Researchers: 1

Project: 60219

Title: Development of Advanced Electrochemical Emission Spectroscopy for Monitoring Corrosion in Simulated DOE Liquid Waste
PI: Dr. Digby D. MacDonald *Institution:* Pennsylvania State University
Student Researchers: 5

Project: 60271

Title: Characterization of a New Family of Metal Transport Proteins
PI: Dr. Mary Lou Guerinot *Institution:* Dartmouth College
Student Researchers: 3

Project: 60326

Title: Isolation of Metals from Liquid Wastes: Reactive Scavenging in Turbulent Thermal Reactors
PI: Dr. Jost O. L. Wendt *Institution:* University of Arizona
Student Researchers: 9

Project: 60328

Title: High Frequency Electromagnetic Impedance Measurements for Characterization, Monitoring and Verification Efforts
PI: Dr. Ki-Ha Lee *Institution:* Lawrence Berkeley National Laboratory
Student Researchers: 1

Project: 60392

Title: Radiolytic and Thermal Process Relevant to Dry Storage of Spent Nuclear Fuels
PI: Dr. Steven C. Marschman *Institution:* Pacific Northwest National Laboratory
Student Researchers: 2

Project: 60401

Title: Mechanism of Pitting Corrosion Prevention By Nitrite in Carbon Steel Exposed to Dilute Salt Solutions
PI: Dr. Philip E. Zapp *Institution:* Westinghouse Savannah River Company
Student Researchers: 3

Project: 60451

Title: Mechanics of Bubbles in Sludges and Slurries
PI: Dr. Phillip A. Gauglitz *Institution:* Pacific Northwest National Laboratory
Student Researchers: 2

Project: 60474

Title: Ultrahigh Sensitivity Heavy Noble Gas Detectors for Long-Term Monitoring and Monitoring Air
PI: Dr. John D. Valentine *Institution:* Georgia Institute of Technology
Student Researchers: 4

Project: 64896

Title: Decontamination of Radionuclides from Concrete During and After Thermal Treatment
PI: Dr. Brian P. Spalding *Institution:* Oak Ridge National Laboratory
Student Researchers: 1

Project: 64912

Title: Improved Decontamination: Interfacial, Transport, and Chemical Properties of Aqueous Surfactant Cleaners
PI: Dr. David W. DePaoli *Institution:* Oak Ridge National Laboratory
Student Researchers: 3

Project: 64931

Title: Microbially Promoted Solubilization of Steel Corrosion Products and Fate of Associated Actinides
PI: Dr. Yuri A. Gorby *Institution:* Pacific Northwest National Laboratory
Student Researchers: 3

Project: 64946

Title: Mechanisms of Radionuclide-Hydroxycarboxylic Acid Interactions for Decontamination of Metallic Surfaces
PI: Dr. A.J. Francis *Institution:* Brookhaven National Laboratory
Student Researchers: 2

Project: 64947

Title: Contaminant-Organic Complexes, Their Structure and Energetics in Surface Decontamination Processes
PI: Dr. Calvin C. Ainsworth *Institution:* Pacific Northwest National Laboratory
Student Researchers: 2

Project: 64965

Title: Supercritical Carbon Dioxide-Soluble Ligands for Extracting Actinide Metal Ions from Porous Solids
PI: Dr. Mark L. Dietz *Institution:* Argonne National Laboratory
Student Researchers: 2

Project: 64979

Title: Decontamination and Decommissioning of PCB Sites at DOE: Extraction, Electrokinetics, and Hydrothermal Oxidation
PI: Dr. Edward A. Hamilton *Institution:* SCUREF
Student Researchers: 4

Project: 65001

Title: Development of Novel, Simple Multianalyte Sensors for Remote Environmental Analysis
PI: Dr. Sanford A. Asher *Institution:* University of Pittsburgh
Student Researchers: 3

Project: 65004

Title: Real-Time Identification and Characterization of Asbestos and Concrete Materials with Radioactive Contamination
PI: Dr. George Xu *Institution:* Rensselaer Polytechnic Institute
Student Researchers: 3

Project: 65328

Title: Electrically Driven Technologies for Radioactive Aerosol Abatement
PI: Dr. David W. DePaoli *Institution:* Oak Ridge National Laboratory
Student Researchers: 3

Project: 65339

Title: Ion Recognition Approach to Volume Reduction of Alkaline Tank Waste by Separation and Recycle of Sodium Hydroxide and Sodium Nitrate
PI: Dr. Bruce A. Moyer *Institution:* Oak Ridge National Laboratory
Student Researchers: 4

Project: 65340

Title: Detection and Characterization of Chemicals Present in Tank Waste
PI: Dr. P. G. Datskos *Institution:* Oak Ridge National Laboratory
Student Researchers: 4

Project: 65351

Title: Solution Effects on Cesium Complexation with Calixarene Crown Ethers from Liquid to Supercritical Fluids
PI: Dr. Chien M. Wai *Institution:* University of Idaho
Student Researchers: 3

Project: 65352

Title: Developing a Fundamental Basis for the Characterization, Separation, and Disposal of Plutonium and Other Actinides in High Level Radioactive Waste: The Effect of Temperature and Electrolyte Concentrations on Actinide Speciation
PI: Dr. Sue B. Clark *Institution:* Washington State University
Student Researchers: 2

Project: 65366

Title: Physical, Chemical and Structural Evolution of Zeolite-Containing Waste Forms Produced From Metakaolinite and Calcined HLW
PI: Dr. Michael W. Grutzeck *Institution:* Pennsylvania State University
Student Researchers: 1

Project: 65410

Title: Rapid Migration of Radionuclides Leaked from High-Level Waste Tanks: A Study of Salinity Gradients, Wetted Path Geometry and Water Vapor Transport
PI: Dr. Anderson L. Ward *Institution:* Pacific Northwest National Laboratory
Student Researchers: 2

Project: 65411

Title: Precipitation and Deposition of Aluminum-Containing Phases in Tank Wastes
PI: Dr. Jun Liu *Institution:* Pacific Northwest National Laboratory
Student Researchers: 1

Project: 65421

Title: Correlation of Chemisorption and Electronic Effects for Metal/Oxide Interfaces: Transducing Principles for Temperature-Programmed Gas Microsensors
PI: Dr. Stephen Semancik *Institution:* National Institute of Standards & Technology -
Student Researchers: 4

Project: 65422

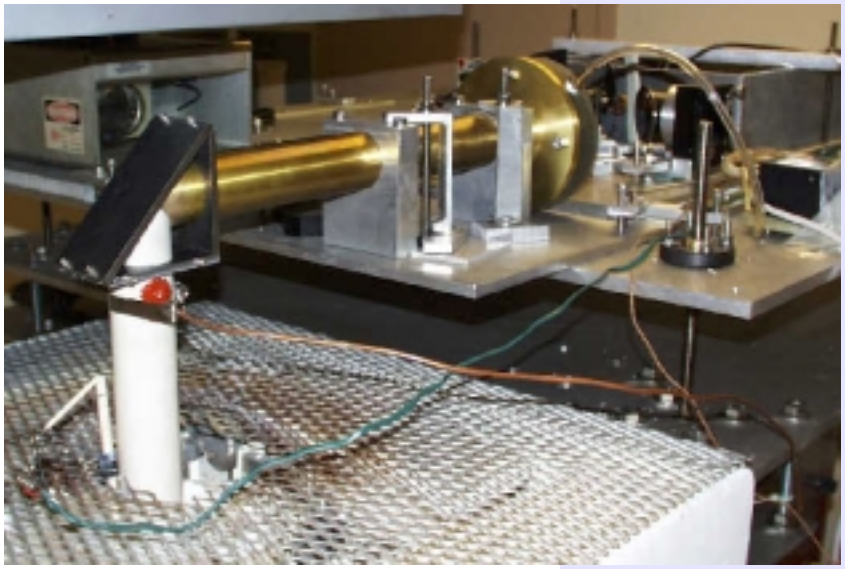
Title: Modeling of Spinel Settling in Waste Glass Melter
PI: Dr. Pavel Hrma *Institution:* Pacific Northwest National Laboratory
Student Researchers: 3

Project: 65425

Title: Mass Spectrometric Fingerprinting of Tank Waste Using Tunable, Ultrafast Infrared Lasers
PI: Dr. Richard F. Haglund,Jr.
Institution: Vanderbilt University
Student Researchers: 2

Project: 65435

Title: Millimeter-Wave Measurements of High Level and Low Activity Glass Melts
PI: Dr. Paul P. Woskov
Institution: Massachusetts Institute of Technology
Student Researchers: 3



Experimental setup for measuring the viscosity inside a melter. The represents the first time that a possibility for such a measurement has ever been demonstrated in real-time. Mullite waveguide shown going down into furnace with pressure sensor connection just below miter bend. Flanged window end of brass waveguide is connected to a hose for pressurizing waveguide with nitrogen when the mullite end of the waveguide is immersed in the glass. Millimeter-wave pyrometer electronics are inside the aluminum box in the background on right. [see Project #65435]

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Communications